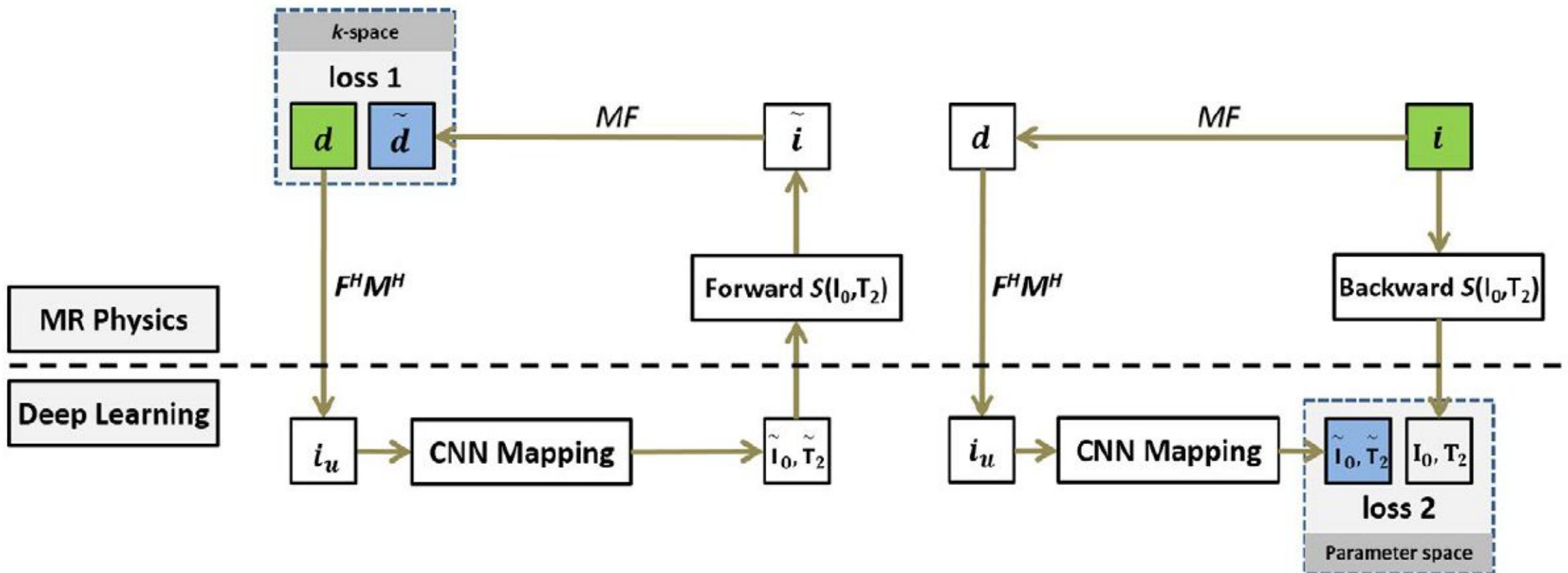


The background of the slide is a collage of various brain MRI slices. These include axial, sagittal, and coronal views of the brain. Some slices show normal brain anatomy, while others show areas of hyperintensity or other abnormalities. Technical labels like 'AP 25', 'AP 72', 'AP 6 an', and 'Sc 6' are visible on some of the slices. A solid orange rectangle is overlaid on the left side of the image, containing the title and author information.

# Model Augmented Neural network with Incoherent k-space Sampling for efficient MR parameter mapping

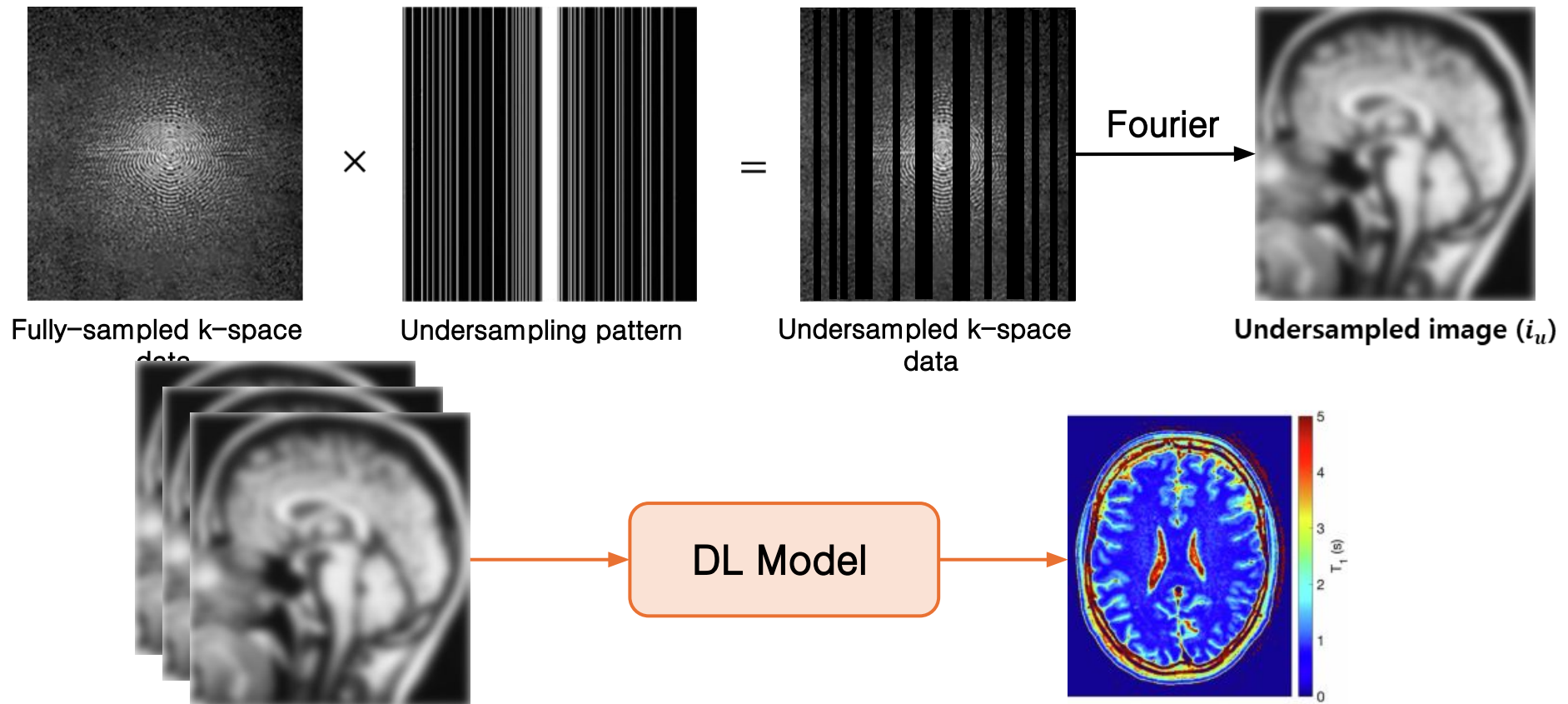
Liu et al.

# MANTIS



# End-to-end CNN mapping (Learning-based)

$$R_{cnn}(I_0, T_2) = \mathbf{E}_{i_u \sim \text{domain}(i_u)} [\|C(i_u|\theta) - (I_0, T_2)\|_2]$$



# Model-based reconstruction

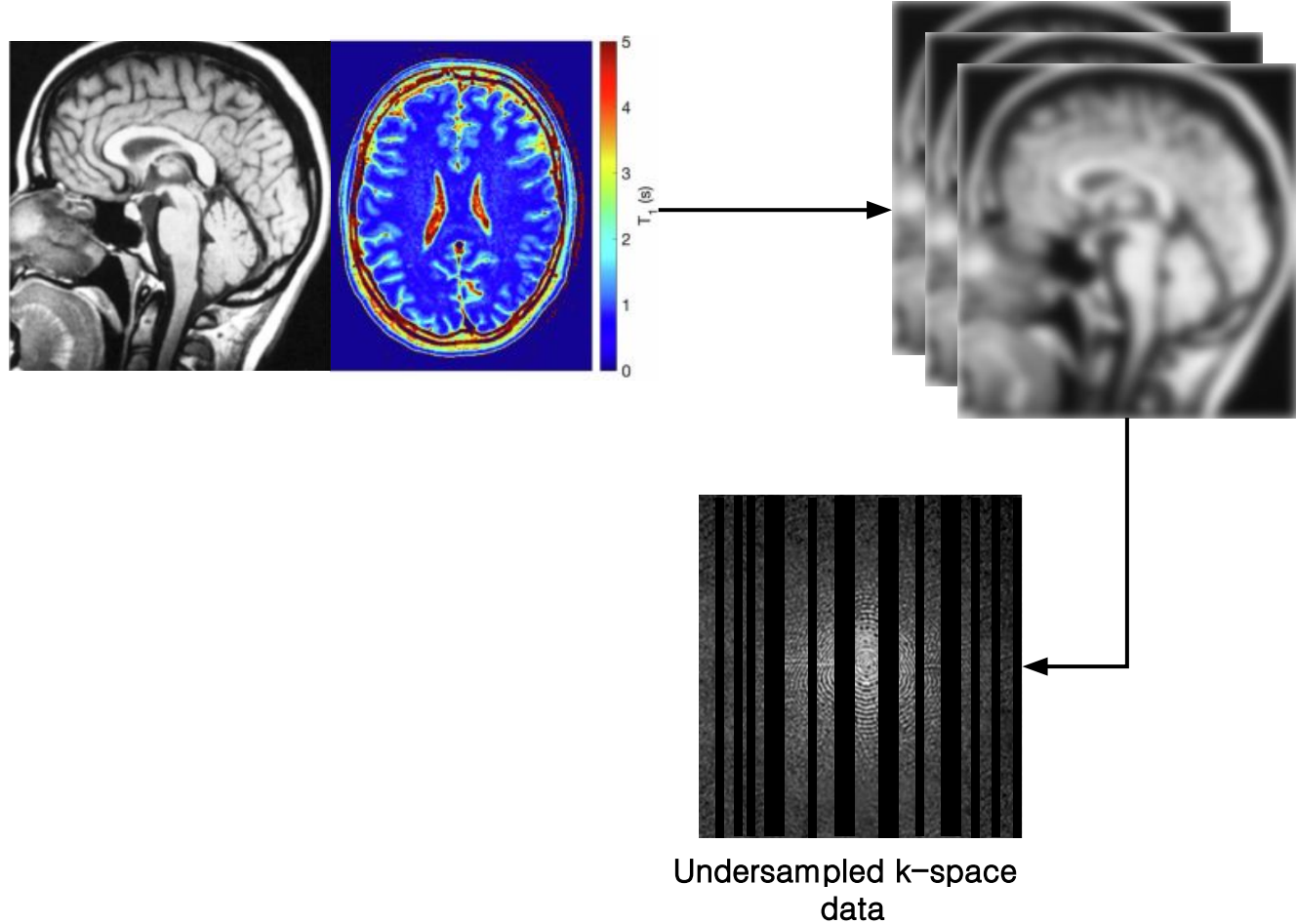
$$i_j = S_j(I_0, T_2) = I_0 \cdot e^{-TE_j/T_2}$$

$E$ : encoding operator

$$d_j = Ei_j + \varepsilon$$

$d$ :  $k$  - space domain  
 $i$ : image domain

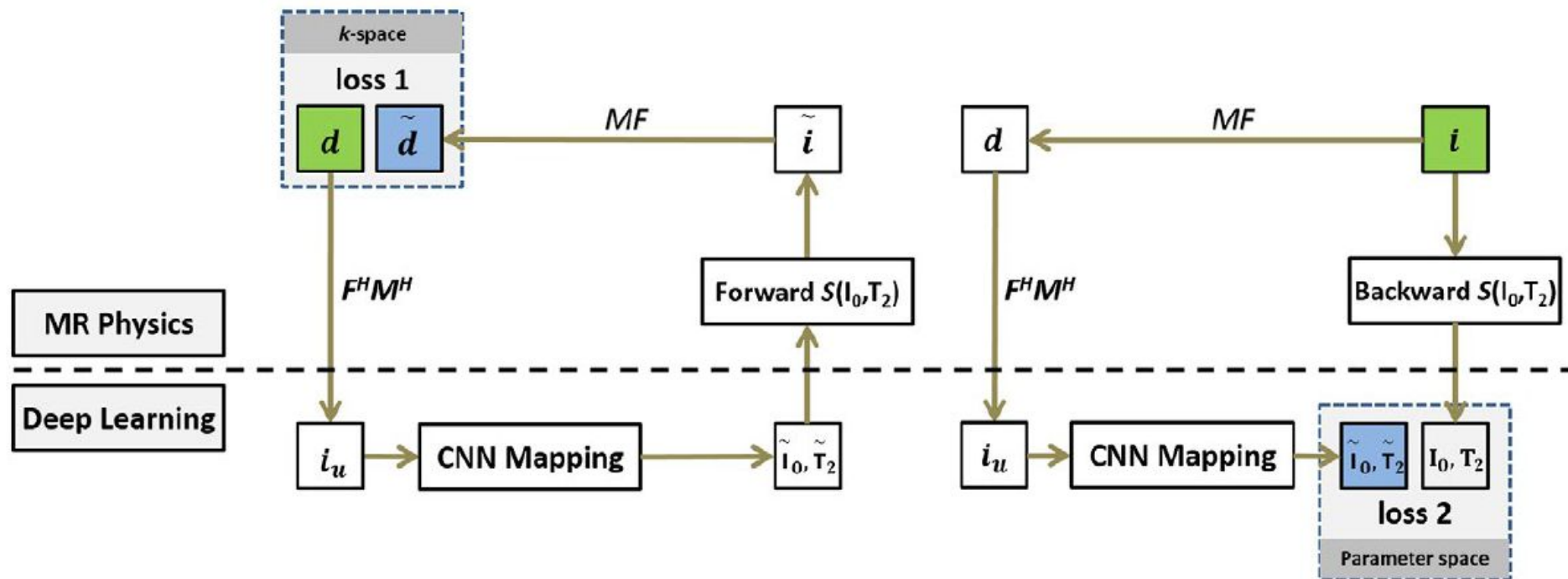
$$\tilde{I}_0, \tilde{T}_2 = \arg \min_{I_0, T_2} \sum_{j=1}^t \|ES_j(I_0, T_2) - d_j\|_2^2$$





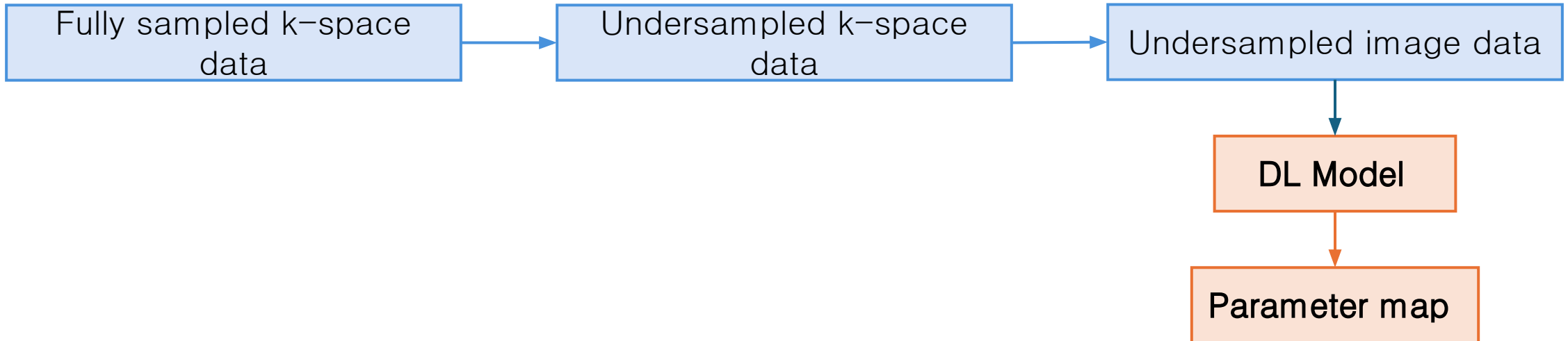
# End-to-end CNN mapping + Model consistency

$$\tilde{\theta} = \arg \min_{\theta} \left( \lambda_{data} \mathbf{E}_{i_u \sim \text{domain}(i_u)} \left[ \sum_{j=1}^t \|ES_j(C(i_u|\theta)) - d_j\|_2^2 \right] + \lambda_{cnn} \mathbf{E}_{i_u \sim \text{domain}(i_u)} [\|C(i_u|\theta) - (I_0, T_2)\|_2] \right)$$



# End-to-end CNN mapping + Model consistency

$$\tilde{\theta} = \arg \min_{\theta} \left( \lambda_{data} \mathbf{E}_{i_u \sim \text{domain}(i_u)} \left[ \sum_{j=1}^t \|ES_j(C(i_u|\theta)) - d_j\|_2^2 \right] + \lambda_{cnn} \mathbf{E}_{i_u \sim \text{domain}(i_u)} [\|C(i_u|\theta) - (I_0, T_2)\|_2] \right)$$



# Undersampling pattern

